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Modern hardware design flows make extensive use of numerical simulations, from initial concept up to pre-manufacturing stage, in order to perform accurate system verifications. These simulations are usually performed by highly trained engineers using Electronic Design Automation tools. However, even the most sophisticated EDA tools are sometimes unable to handle the complexity of modern designs, leading to poor results with very slow problem setup and runtime. This is often the case for pre- and post-layout **Signal/Power Integrity** and Electromagnetic Compatibility **system-level verification.**

The above considerations led to substantial research efforts in the last two decades towards accurate and efficient macromodeling algorithms, aimed at extracting **compact reduced-order models** of complex electromagnetic structures (such as signal and power buses), capable of speeding up system-level analyses significantly. Several macromodeling algorithms with passivity constraints have been presented and are nowadays commonly used in modern design flows. Yet, user interaction is still required to tune and optimize the macromodel extraction.

This project is finalized at the simplification and speedup of the macromodeling flows, via deployment of a fully **automated web service that will provide state-of-the-art engineering models** using a high-performance computing cluster. We demonstrate a fully functional prototype of a hardware/software infrastructure [1], which can be accessed publicly over the Internet via standard browsers. The main features of the proposed infrastructure are

Scalability. Most prominent macromodeling algorithms [2,3] have been parallelized and deployed on a high-performance computing cluster available in our department. This enables broadband macromodeling of **complex interconnects having hundred of ports**, as required by most challenging applications.

Interactivity. A front end has been developed, including a load-balanced cluster of web application servers, enabling a **real-time interaction** between the user and the computing cluster. Various interconnected services allow real-time data upload (Touchstone format), data visualization and qualification for causality and passivity, model extraction, validation, and export (download) into common SPICE formats.

This research activity has been possible thanks to several sponsors, including IBM (who donated the computing cluster via a Shared University Research Grant), IdemWorks (who sponsored the algorithm parallelization), the Italian Government (Grant for projects of national interest #2008W5P2K), and EU/Regional funds for development of Software-as-a-Service platforms.

It is expected that the availability of this HPM service will set a new standard for both industry and academia, for the fast dissemination of research results as services in the era of cloud computing.

References

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